

09/856,543

=> s hydrogen electrode? and nucleic acid hybridi?

4 FILES SEARCHED...

L10 7 HYDROGEN ELECTRODE? AND NUCLEIC ACID HYBRIDI?

=> d l10 bib abs 1-7

L10 ANSWER 1 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2000-482839 [42] WPIDS

CR 1999-372624 [32]

DNC C2000-145333

TI Modified nucleic acid oligomer used for electrical detection of hybridization, has covalently bonded to it redox-active units containing electron-donor and -acceptor molecules.

DC B04 D16

IN HARTWICH, G

PA (HART-I) HARTWICH G; (FRIZ-N) FRIZ BIOCHEM GMBH; (FRIZ-N) RIZ BIOCHEM CO LTD

CYC 88

PI WO 2000042217 A2 20000720 (200042)\* DE 76p

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
OA PT SD SE SL SZ TZ UG ZW

W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DK EE ES FI GB GD  
GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV  
MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT  
UA UG US UZ VN YU ZA ZW

DE 19926457 A1 20000727 (200042)

AU 2000026627 A 20000801 (200054)

NO 2001003471 A 20010913 (200163)

EP 1144685 A2 20011017 (200169) DE

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

BR 2000007571 A 20011127 (200203)

CZ 2001002503 A3 20020116 (200215)

KR 2001101477 A 20011114 (200230)

ZA 2001005097 A 20020424 (200237) # 99p

HU 2001005170 A2 20020528 (200249)

CN 1352697 A 20020605 (200261)

AU 758063 B 20030313 (200328)

EP 1144685 B1 20030423 (200329) DE

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

DE 50001859 G 20030528 (200336)

JP 2003521465 W 20030715 (200347) 93p

MX 2001007183 A1 20020601 (200365)

ADT WO 2000042217 A2 WO 2000-EP84 20000107; DE 19926457 A1 DE 1999-19926457  
19990429; AU 2000026627 A AU 2000-26627 20000107; NO 2001003471 A WO  
2000-EP84 20000107, NO 2001-3471 20010713; EP 1144685 A2 EP 2000-904884  
20000107, WO 2000-EP84 20000107; BR 2000007571 A BR 2000-7571 20000107, WO  
2000-EP84 20000107; CZ 2001002503 A3 WO 2000-EP84 20000107, CZ 2001-2503  
20000107; KR 2001101477 A KR 2001-708801 20010712; ZA 2001005097 A ZA  
2001-5097 20010621; HU 2001005170 A2 WO 2000-EP84 20000107, HU 2001-5170  
20000107; CN 1352697 A CN 2000-803149 20000107; AU 758063 B AU 2000-26627  
20000107; EP 1144685 B1 EP 2000-904884 20000107, WO 2000-EP84 20000107; DE  
50001859 G DE 2000-501859 20000107, EP 2000-904884 20000107, WO 2000-EP84  
20000107; JP 2003521465 W JP 2000-593774 20000107, WO 2000-EP84 20000107;  
MX 2001007183 A1 WO 2000-EP84 20000107, MX 2001-7183 20010713

FDT AU 2000026627 A Based on WO 2000042217; EP 1144685 A2 Based on WO  
2000042217; BR 2000007571 A Based on WO 2000042217; CZ 2001002503 A3 Based  
on WO 2000042217; HU 2001005170 A2 Based on WO 2000042217; AU 758063 B  
Previous Publ. AU 2000026627, Based on WO 2000042217; EP 1144685 B1 Based

09567863

on WO 2000042217; DE 50001859 G Based on EP 1144685, Based on WO 2000042217; JP 2003521465 W Based on WO 2000042217; MX 2001007183 A1 Based on WO 2000042217

PRAI DE 1999-19926457 19990429; DE 1999-19901761 19990118; ZA 2001-5097 20010621

AN 2000-482839 [42] WPIDS

CR 1999-372624 [32]

AB WO 200042217 A UPAB: 20031009

NOVELTY - Nucleic acid oligomer (A) is modified by covalent bonding to it of a redox-active unit (I) comprising one or more each of electron-donor (ED) molecules (II) and electron-acceptor (EA) molecules (III).

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a method for producing (A);

(2) a conductive surface (B) modified by attachment of one or more types of (A);

(3) a method for producing (B); and

(4) a method for electrochemical detection of oligomer hybridization by incubating (B) with nucleic acid oligomer and detecting subsequent electrical communication between (I) and the conducting surface.

USE - Electrically conductive surfaces modified with (A) are used for sequence-specific detection of **nucleic acid**

**hybridization**, e.g. for clinical diagnosis, toxicological testing or generally in research and development, e.g. for nucleic acid sequencing.

ADVANTAGE - Electrical detection of hybridization is simple and inexpensive and makes possible development of a battery-operated system for on site analysis. It eliminates the need for gel electrophoresis and the associated use of radioisotopes or mutagenic dyes.

DESCRIPTION OF DRAWING(S) - Diagram of gold surface derivatized with an oligonucleotide that has been modified by attachment of ubiquinone (electron acceptor; UQ) at the 5'-end. When induced, electrons will pass from the reaction center (RC, e.g. from the photosynthetic bacterium *Rhodobacter sphaeroides*) to UQ and from there to the gold surface, but only if the oligonucleotide is hybridized to its complement. When in unhybridized form, the oligonucleotide has electrical conductivity too low to transport electrons to the gold surface.

Dwg.4/6

L10 ANSWER 2 OF 7 USPATFULL on STN

AN 2003:330143 USPATFULL

TI Nucleic acid reactions using labels with different redox potentials

IN Yu, Changjun, Pasadena, CA, UNITED STATES

Tor, Yitzhak, San Diego, CA, UNITED STATES

PI US 2003232354 A1 20031218

AI US 2003-336225 A1 20030102 (10)

RLI Continuation of Ser. No. US 2002-116726, filed on 3 Apr 2002, ABANDONED

Continuation of Ser. No. US 2000-626096, filed on 26 Jul 2000, PENDING

PRAI US 2001-281276P 20010403 (60)

DT Utility

FS APPLICATION

LREP DORSEY & WHITNEY LLP, INTELLECTUAL PROPERTY DEPARTMENT, 4 EMBARCADERO CENTER, SUITE 3400, SAN FRANCISCO, CA, 94111

CLMN Number of Claims: 25

ECL Exemplary Claim: 1

DRWN 40 Drawing Page(s)

LN.CNT 3998

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention is directed to methods and compositions for the use of electron transfer moieties with different redox potentials to electronically detect nucleic acids, particularly for the electrochemical sequencing of DNA.

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CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 3 OF 7 USPATFULL on STN  
AN 2003:219700 USPATFULL  
TI Compositions and methods for detecting redox-active molecules in solution  
IN Creager, Stephen E., Central, SC, UNITED STATES  
French, Marla, Derwood, MD, UNITED STATES  
Radford, Philip T., Roebuck, SC, UNITED STATES  
PI US 2003152990 A1 20030814  
AI US 2003-368820 A1 20030219 (10)  
RLI Continuation of Ser. No. US 2001-805549, filed on 13 Mar 2001, ABANDONED  
PRAI US 2000-192211P 20000327 (60)  
DT Utility  
FS APPLICATION  
LREP DORITY & MANNING, P.A., POST OFFICE BOX 1449, GREENVILLE, SC, 29602-1449  
CLMN Number of Claims: 21  
ECL Exemplary Claim: 1  
DRWN 10 Drawing Page(s)  
LN.CNT 587

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An electrochemical amplification scheme for detecting very small amounts of redox-active molecules is disclosed. The reaction involves "recycling" of oxidized analyte molecules by way of a solution-phase electron exchange reaction with a sacrificial electron donor. The scheme relies heavily upon the action of a selective monolayer coating on the electrode that suppresses direct oxidation of the sacrificial donor but facilitates the oxidation of analyte molecules. The method is particularly useful for detection of hydroxymethylferrocene at a dodecanethiolate-coated gold electrode with ferrocyanide as the sacrificial electron donor.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 4 OF 7 USPATFULL on STN  
AN 2003:207198 USPATFULL  
TI Nucleic acid reactions using labels with different redox potentials  
IN Blackburn, Gary, Glendora, CA, UNITED STATES  
Kayyem, Jon Faiz, Pasadena, CA, UNITED STATES  
Tao, Chunlin, Beverly Hills, CA, UNITED STATES  
Yu, Changjun, Pasadena, CA, UNITED STATES  
PI US 2003143556 A1 20030731  
AI US 2002-137710 A1 20020430 (10)  
RLI Continuation-in-part of Ser. No. US 2002-116726, filed on 3 Apr 2002, ABANDONED  
PRAI US 2001-281276P 20010403 (60)  
DT Utility  
FS APPLICATION  
LREP DORSEY & WHITNEY LLP, INTELLECTUAL PROPERTY DEPARTMENT, 4 EMBARCADERO CENTER, SUITE 3400, SAN FRANCISCO, CA, 94111  
CLMN Number of Claims: 25  
ECL Exemplary Claim: 1  
DRWN 44 Drawing Page(s)  
LN.CNT 3898

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention is directed to methods and compositions for the use of electron transfer moieties with different redox potentials to electronically detect nucleic acids, particularly for the electrochemical sequencing of DNA.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

09567863

L10 ANSWER 5 OF 7 USPATFULL on STN  
AN 2002:60910 USPATFULL  
TI Compositions and methods for detecting redox-active molecules in solution  
IN Creager, Stephen E., Central, SC, UNITED STATES  
PI US 2002034744 A1 20020321  
AI US 2001-805549 A1 20010313 (9)  
PRAI US 2000-192211P 20000327 (60)  
DT Utility  
FS APPLICATION  
LREP John E. Vick, Jr., Dority & Manning, Attorneys at Law, P.A., P.O. Box 1449, Greenville, SC, 29602  
CLMN Number of Claims: 21  
ECL Exemplary Claim: 1  
DRWN 6 Drawing Page(s)  
LN.CNT 587  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB An electrochemical amplification scheme for detecting very small amounts of redox-active molecules is disclosed. The reaction involves "recycling" of oxidized analyte molecules by way of a solution-phase electron exchange reaction with a sacrificial electron donor. The scheme relies heavily upon the action of a selective monolayer coating on the electrode that suppresses direct oxidation of the sacrificial donor but facilitates the oxidation of analyte molecules. The method is particularly useful for detection of hydroxymethylferrocene at a dodecanethiolate-coated gold electrode with ferrocyanide as the sacrificial electron donor.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 6 OF 7 USPATFULL on STN  
AN 2001:157679 USPATFULL  
TI Systems for electrophoretic transport and detection of analytes  
IN Kayyem, Jon Faiz, Pasadena, CA, United States  
Blackburn, Gary, Glendora, CA, United States  
O'Connor, Stephen D., Pasadena, CA, United States  
PA Clinical Micro Sensors, Inc., Pasadena, CA, United States (U.S. corporation)  
PI US 6290839 B1 20010918  
AI US 1998-134058 19980814 (9)  
PRAI US 1998-90389P 19980623 (60)  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Tung, T.; Assistant Examiner: Noguerola, Alex  
LREP Flehr Hohbach Test Albritton & Herbert LLP, Trecartin, Esq., Richard F., Silva, Esq., Robin M.  
CLMN Number of Claims: 28  
ECL Exemplary Claim: 1  
DRWN 44 Drawing Figure(s); 21 Drawing Page(s)  
LN.CNT 4594  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The invention relates to compositions and methods useful in the electrophoretic transport of target analytes to a detection electrode comprising a self-assembled monolayer (SAM). Detection proceeds through the use of an electron transfer moiety (ETM) that is associated with the target analyte, either directly or indirectly, to allow electronic detection of the ETM.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 7 OF 7 USPATFULL on STN

09567863

AN 2001:116434 USPATFULL  
TI Binding acceleration techniques for the detection of analytes  
IN Blackburn, Gary, Glendora, CA, United States  
Creager, Stephen E., Central, SC, United States  
Fraser, Scott, La Canada, CA, United States  
Irvine, Bruce D., Glendora, CA, United States  
Meade, Thomas J., Altadena, CA, United States  
O'Connor, Stephen D., Pasadena, CA, United States  
Terbrueggen, Robert H., Manhattan Beach, CA, United States  
Vielmetter, Jost G., Pasadena, CA, United States  
Welch, Thomas W., Pasadena, CA, United States  
PA Clinical Micro Sensors, Inc., Pasadena, CA, United States (U.S.  
corporation)  
PI US 6264825 B1 20010724  
AI US 1999-338726 19990623 (9)  
RLI Continuation of Ser. No. US 1998-134058, filed on 14 Aug 1998  
PRAI US 1998-90389P 19980623 (60)  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Tung, T.; Assistant Examiner: Noguerola, Alex  
LREP Flehr Hohabch Test Albritton & Herbert LLP, Trecartin, Esq., Richard F.,  
Silva, Esq., Robin M.  
CLMN Number of Claims: 29  
ECL Exemplary Claim: 1  
DRWN 49 Drawing Figure(s); 22 Drawing Page(s)  
LN.CNT 5644  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The invention relates to compositions and methods useful in the  
acceleration of binding of target analytes to capture ligands on  
surfaces. Detection proceeds through the use of an electron transfer  
moiety (ETM) that is associated with the target analyte, either directly  
or indirectly, to allow electronic detection of the ETM.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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=> d his

(FILE 'HOME' ENTERED AT 15:12:57 ON 20 FEB 2004)

FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 15:13:19 ON  
20 FEB 2004

L1 18774 S CONDUCTIVE SURFACE?  
L2 16 S L1 AND NUCLEIC ACID? (7A) REDOX  
L3 11 S L2 AND POTENTIAL  
L4 1 S L3 AND HYDROGEN ELECTRODE  
L5 5 S L2 NOT L3

=> s l1 and hydrogen electrode

L6 40 L1 AND HYDROGEN ELECTRODE

=> s l2 and nucleic acid?

3 FILES SEARCHED...

L7 16 L2 AND NUCLEIC ACID?

=> s l7 not l5

L8 11 L7 NOT L5

=> dup rem l8

PROCESSING COMPLETED FOR L8

L9 11 DUP REM L8 (0 DUPLICATES REMOVED)

=> d l9 bib abs 1-11

L9 ANSWER 1 OF 11 USPATFULL on STN

AN 2004:24676 USPATFULL

TI Compositions selective for adenosine diphosphate and methods of using  
same

IN Diener, John L., Cambridge, MA, UNITED STATES  
Srinivasan, Jayaram, Murrysville, PA, UNITED STATES  
Hamaguchi, Nobuko, Framingham, MA, UNITED STATES  
Blanchard, Jill, Arlington, MA, UNITED STATES  
Kurz, Jeffrey, Somerville, MA, UNITED STATES  
Kurz, Markus, Newton, MA, UNITED STATES  
Cload, Sharon T., Cambridge, MA, UNITED STATES  
Epstein, David, Belmont, MA, UNITED STATES  
Wilson, Charles, Concord, MA, UNITED STATES  
Stanton, Martin, Stow, MA, UNITED STATES

PI US 2004018515 A1 20040129  
AI US 2003-406027 A1 20030402 (10)  
PRAI US 2002-369680P 20020403 (60)  
US 2002-370196P 20020405 (60)  
US 2003-437949P 20030103 (60)

DT Utility

FS APPLICATION

LREP MINTZ, LEVIN, COHN, FERRIS, GLOVSKY, AND POPEO, P.C., ONE FINANCIAL  
CENTER, BOSTON, MA, 02111

CLMN Number of Claims: 100

ECL Exemplary Claim: 1

DRWN 80 Drawing Page(s)

LN.CNT 5765

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions which recognize and report on the concentration selectively  
adenosine diphosphate (ADP) and methods of making and using them are  
provided. The invention further relates to methods of using the  
compositions to monitor function of biological agents. Reagents and

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systems for performing the methods are also provided. The methods of the invention are useful in diagnostic applications and drug optimization.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 2 OF 11 USPATFULL on STN  
AN 2004:16354 USPATFULL  
TI Method and apparatus for manipulating polarizable analytes via dielectrophoresis  
IN Zenhausern, Frederic, Fountain Hills, AZ, UNITED STATES  
Chou, Chia-Fu, Chandler, AZ, UNITED STATES  
Terbrueggen, Robert Henry, Manhattan Beach, CA, UNITED STATES  
PI US 2004011650 A1 20040122  
AI US 2002-201613 A1 20020722 (10)  
DT Utility  
FS APPLICATION  
LREP DORSEY & WHITNEY LLP, Four Embarcadero Center-Suite 3400, San Francisco, CA, 94111-4187  
CLMN Number of Claims: 16  
ECL Exemplary Claim: 1  
DRWN 3 Drawing Page(s)  
LN.CNT 3262

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention is directed to devices and methods for manipulating polarizable analytes via dielectrophoresis to allow for improved detection of target analytes. Microfluidic devices are configured such that the application of a voltage between field-generating electrodes results in the generation of an asymmetric electric field within the device. Some embodiments of the invention provide a physical constriction, and electrically floating conductive material or a combination of the two techniques to generating an asymmetrical field. Using dielectrophoresis, target analytes are concentrated or separated from contaminant analytes and transported to a detection module.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 3 OF 11 USPATFULL on STN  
AN 2003:324628 USPATFULL  
TI Compositions selective for caffeine or aspartame and methods of using same  
IN Cload, Sharon T., Cambridge, MA, UNITED STATES  
Ferguson, Alicia, Somerville, MA, UNITED STATES  
PI US 2003228603 A1 20031211  
AI US 2003-406903 A1 20030403 (10)  
PRAI US 2002-370266P 20020405 (60)  
US 2002-398858P 20020725 (60)  
DT Utility  
FS APPLICATION  
LREP MINTZ, LEVIN, COHN, FERRIS, GLOVSKY, AND POPEO, P.C., ONE FINANCIAL CENTER, BOSTON, MA, 02111  
CLMN Number of Claims: 48  
ECL Exemplary Claim: 1  
DRWN 48 Drawing Page(s)  
LN.CNT 4998

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions which recognize and report on the concentration of caffeine or aspartame target molecules. The invention further relates to methods of using the compositions to monitor the presence or concentration of such targets in a variety of samples, including those samples to be ingested, such as beverages, e.g., coffee or soft drinks.

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CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 4 OF 11 USPATFULL on STN  
AN 2003:298226 USPATFULL  
TI Methods and compositions relating to electrical detection of  
**nucleic acid** reactions  
IN Choong, Vi-En, Chandler, AZ, UNITED STATES  
Gallagher, Sean R., Claremont, CA, UNITED STATES  
Gaskin, Mike, Chandler, AZ, UNITED STATES  
Li, Changming, Phoenix, AZ, UNITED STATES  
Maracas, George, Phoenix, AZ, UNITED STATES  
Shi, Song, Phoenix, AZ, UNITED STATES  
PI US 2003209432 A1 20031113  
AI US 2003-149319 A1 20030228 (10)  
WO 2000-US33497 20001211  
DT Utility  
FS APPLICATION  
LREP Robin M Silva, Dorsey & Whitney, Intellectual Property Department, Four  
Embarcadero Center Suite 3400, San Francisco, CA, 94111-4187  
CLMN Number of Claims: 7  
ECL Exemplary Claim: 1  
DRWN 10 Drawing Page(s)  
LN.CNT 2619

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB This invention relates to the detection of molecular interactions  
between biological molecules. Specifically, the invention relates to  
electrical detection of interactions such as hybridization between  
**nucleic acids** or peptide antigen-antibody interaction  
using arrays of peptides or oligonucleotides. In particular, the  
invention relates to an apparatus and methods for detecting  
**nucleic acid** hybridization or peptide binding using  
electronic methods including AC impedance. In some embodiments, no  
electrochemical or other label moieties are used. In others,  
electrochemically active labels are used to detect reactions on hydrogel  
arrays, including genotyping reactions such as the single base extension  
reaction.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 5 OF 11 USPATFULL on STN  
AN 2002:99079 USPATFULL  
TI REPORTERLESS GENOSENSORS USING ELECTRICAL DETECTION METHODS  
IN LI, CHANGMING, PHOENIX, AZ, UNITED STATES  
SHI, SONG, PHOENIX, AZ, UNITED STATES  
MARACAS, GEORGE, PHOENIX, AZ, UNITED STATES  
CHOONG, VI-EN, CHANDLER, AZ, UNITED STATES  
PI US 2002051975 A1 20020502  
AI US 1999-458533 A1 19991209 (9)  
DT Utility  
FS APPLICATION  
LREP ROBIN M. SILVA, ESQ., FLEHR HOHBACH TEST ALBRITTON AND HERBERT, LLP,  
FOUR EMBARCADERO CENTER, SUITE 3400, SAN FRANCISCO, CA, 94111  
CLMN Number of Claims: 35  
ECL Exemplary Claim: 1  
DRWN 14 Drawing Page(s)  
LN.CNT 1044

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention provides an apparatus and methods for detecting  
cation interactions associated with molecular interactions using AC  
impedance, but without the use of electrochemical or other reporters to  
obtain measurable signals. The methods can be used for electrical  
detection of molecular interactions between probe molecules bound to



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defined regions of an array and target molecules which are permitted to interact with the probe molecules.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 6 OF 11 USPATFULL on STN  
AN 2002:27117 USPATFULL  
TI Molecular wire injection sensors  
IN Keen, Randy E., San Diego, CA, UNITED STATES  
PA KeenSense, Inc. (U.S. corporation)  
PI US 2002015963 A1 20020207  
AI US 2001-960165 A1 20010920 (9)  
RLI Continuation-in-part of Ser. No. US 1999-365109, filed on 30 Jul 1999, PENDING  
DT Utility  
FS APPLICATION  
LREP BEYER WEAVER & THOMAS LLP, P.O. BOX 778, BERKELEY, CA, 94704-0778  
CLMN Number of Claims: 21  
ECL Exemplary Claim: 1  
DRWN 7 Drawing Page(s)  
LN.CNT 2729

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed is a sensor for sensing the presence of an analyte component without relying on redox mediators. This sensor includes (a) a plurality of conductive polymer strands each having at least a first end and a second end and each aligned in a substantially common orientation; (b) a plurality of molecular recognition headgroups having an affinity for the analyte component and being attached to the first ends of the conductive polymer strands; and (c) an electrode substrate attached to the conductive polymer strands at the second ends. The electrode substrate is capable of reporting to an electronic circuit reception of mobile charge carriers (electrons or holes) from the conductive polymer strands. The electrode substrate may be a photovoltaic diode.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 7 OF 11 USPATFULL on STN  
AN 2002:275932 USPATFULL  
TI Doped conducting polymers applications and methods  
IN Wang, Joseph, Las Cruces, NM, United States  
Jiang, Mian, Las Cruces, NM, United States  
Mukherjee, Baidehi, Binghamton, NY, United States  
Fortes, Antonio, Minneapolis, MN, United States  
PA New Mexico State University Technology Transfer Corporation, Las Cruces, NM, United States (U.S. corporation)  
PI US 6468785 B1 20021022  
AI US 2000-507387 20000218 (9)  
PRAI US 1999-120778P 19990219 (60)  
US 1999-131786P 19990430 (60)  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Whisenant, Ethan C.; Assistant Examiner: Lu, Frank  
LREP Slusher, Stephen A., Ownbey, Nancy E.  
CLMN Number of Claims: 24  
ECL Exemplary Claim: 1  
DRWN 16 Drawing Figure(s); 11 Drawing Page(s)  
LN.CNT 1418

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An apparatus for electrochemical detection of DNA hybridization utilizing oligonucleotide-containing polymer-coated electrodes, and an apparatus for electrochemical detection of **nucleic acids** in flowing streams using doped polymer-coated electrodes.

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Also provided are methods for detection of DNA hybridization and for detection of **nucleic acids** in flowing streams.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 8 OF 11 USPATFULL on STN  
AN 2001:220900 USPATFULL  
TI Molecular wire injection sensors  
IN Keen, Randy E., San Diego, CA, United States  
PA KeenSense, Inc., San Diego, CA, United States (U.S. corporation)  
PI US 6326215 B1 20011204  
AI US 1999-365109 19990730 (9)  
RLI Division of Ser. No. US 1997-856822, filed on 14 May 1997, now patented, Pat. No. US 6060327  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Chin, Christopher L.  
LREP Beyer Weaver & Thomas LLP  
CLMN Number of Claims: 27  
ECL Exemplary Claim: 1  
DRWN 7 Drawing Figure(s); 6 Drawing Page(s)  
LN.CNT 3114

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed is a sensor for sensing the presence of an analyte component without relying on redox mediators. This sensor includes (a) a plurality of conductive polymer strands each having at least a first end and a second end and each aligned in a substantially common orientation; (b) a plurality of molecular recognition headgroups having an affinity for the analyte component and being attached to the first ends of the conductive polymer strands; and (c) an electrode substrate attached to the conductive polymer strands at the second ends. The electrode substrate is capable of reporting to an electronic circuit reception of mobile charge carriers (electrons or holes) from the conductive polymer strands. The electrode substrate may be a photovoltaic diode. Also disclosed is method of forming a sensor capable of sensing the presence of an analyte component. This method includes (a) contacting a sensor substrate (e.g., a device element of a device on semiconductor chip) with a first medium containing mobile conductive polymer strands or precursors of the conductive polymer strands; (b) applying a first potential to the substrate sufficient to form a first structure having the conductive polymer strands affixed into the substrate; (c) contacting the sensor substrate, with affixed conductive polymer strands, with a second medium containing mobile molecular recognition headgroups; and (d) applying a second potential to the substrate sufficient to affix the molecular recognition headgroups to the affixed conductive polymer strands.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 9 OF 11 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2000-411931 [35] WPIDS  
DNC C2000-124823  
TI Modified **nucleic acid** oligomer, useful for sequencing by hybridization, is substituted by redox agent to allow electrical detection of hybridization.  
DC B04 C07 D16 L02 L03  
IN HARTWICH, G; HELLER, A  
PA (HART-I) HARTWICH G; (FRIZ-N) FRIZ BIOCHEM GMBH  
CYC 88  
PI WO 2000031101 A1 20000602 (200035)\* DE 49p  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
OA PT SD SE SL SZ TZ UG ZW

W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DK EE ES FI GB GD  
 GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV  
 MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT  
 UA UG US UZ VN YU ZA ZW

DE 19921940 A1 20000615 (200035)  
 AU 2000013836 A 20000613 (200043)  
 DE 19964220 A1 20010419 (200123)  
 EP 1133514 A1 20010919 (200155) DE

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI

BR 9915526 A 20011113 (200201)  
 KR 2001080973 A 20010825 (200215)  
 CN 1324365 A 20011128 (200219)  
 MX 2001003985 A1 20010601 (200235)  
 AU 751220 B 20020808 (200263)  
 JP 2002532386 W 20021002 (200279) 69p  
 DE 19921940 C2 20030206 (200312)  
 DE 19964220 C2 20030703 (200345)  
 ZA 2001003180 A 20030625 (200348) 64p  
 RU 2213095 C2 20030927 (200371)

ADT WO 2000031101 A1 WO 1999-EP8888 19991119; DE 19921940 A1 DE 1999-19921940  
 19990429; AU 2000013836 A AU 2000-13836 19991119; DE 19964220 A1 Div ex DE  
 1999-19921940 19990429, DE 1999-19964220 19990429; EP 1133514 A1 EP  
 1999-972637 19991119, WO 1999-EP8888 19991119; BR 9915526 A BR 1999-15526  
 19991119, WO 1999-EP8888 19991119; KR 2001080973 A KR 2001-705877  
 20010510; CN 1324365 A CN 1999-812448 19991119; MX 2001003985 A1 MX  
 2001-3985 20010420; AU 751220 B AU 2000-13836 19991119; JP 2002532386 W WO  
 1999-EP8888 19991119, JP 2000-583928 19991119; DE 19921940 C2 DE  
 1999-19921940 19990429; DE 19964220 C2 Div ex DE 1999-19921940 19990429,  
 DE 1999-19964220 19990429; ZA 2001003180 A ZA 2001-3180 20010419; RU  
 2213095 C2 WO 1999-EP8888 19991119, RU 2001-114192 19991119

FDT AU 2000013836 A Based on WO 2000031101; DE 19964220 A1 Div ex DE 19921940;  
 EP 1133514 A1 Based on WO 2000031101; BR 9915526 A Based on WO 2000031101;  
 AU 751220 B Previous Publ. AU 2000013836, Based on WO 2000031101; JP  
 2002532386 W Based on WO 2000031101; DE 19921940 C2 Div in DE 19964220; DE  
 19964220 C2 Div ex DE 19921940; RU 2213095 C2 Based on WO 2000031101

PRAI DE 1999-19921940 19990429; DE 1998-19853957 19981123

AN 2000-411931 [35] WPIDS

AB WO 200031101 A UPAB: 20000725

NOVELTY - **Nucleic acid** oligomer (I) modified by a  
**redox**-active substance (II) that is oxidizable and reducible  
 selectively at a potential ( $\phi$ ) of 2 to -2 V, relative to the standard  
 hydrogen electrode, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the  
 following:

- (a) a method for producing (I);
- (b) a modified **conductive surface** that has one or  
 more types of (I) bound to it;
- (c) a method for producing surfaces of (b); and
- (d) a method for electrochemical detection of **nucleic  
 acid** oligomer hybridization events, using the surface of (b).

USE - (I) is useful for DNA or RNA sequencing, e.g. in clinical  
 diagnosis, toxicological testing, for research and development in  
 genetics, agriculture and pharmaceuticals.

ADVANTAGE - (I) permits electrical detection of a hybridization  
 signal (eliminating the need for fluorophores, radioisotopes etc.),  
 resulting in a simple and inexpensive method for sequence determination.  
 It also opens up the possibility of developing a battery-operated  
 sequencer for use in the field.

Dwg.0/5

09567863

AN 2000:57621 USPATFULL  
TI Molecular wire injection sensors  
IN Keen, Randy E., San Diego, CA, United States  
PA Keensense, Inc., San Diego, CA, United States (U.S. corporation)  
PI US 6060327 20000509  
AI US 1997-856822 19970514 (8)  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Chin, Christopher L.  
LREP Beyer & Weaver, LLP  
CLMN Number of Claims: 36  
ECL Exemplary Claim: 1  
DRWN 7 Drawing Figure(s); 6 Drawing Page(s)  
LN.CNT 2968

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed is a sensor for sensing the presence of an analyte component without relying on redox mediators. This sensor includes (a) a plurality of conductive polymer strands each having at least a first end and a second end and each aligned in a substantially common orientation; (b) a plurality of molecular recognition headgroups having an affinity for the analyte component and being attached to the first ends of the conductive polymer strands; and (c) an electrode substrate attached to the conductive polymer strands at the second ends. The electrode substrate is capable of reporting to an electronic circuit reception of mobile charge carriers (electrons or holes) from the conductive polymer strands. The electrode substrate may be a photovoltaic diode.

Also disclosed is method of forming a sensor capable of sensing the presence of an analyte component. This method includes (a) contacting a sensor substrate (e.g., a device element of a device on semiconductor chip) with a first medium containing mobile conductive polymer strands or precursors of the conductive polymer strands; (b) applying a first potential to the substrate sufficient to form a first structure having the conductive polymer strands affixed to the substrate; (c) contacting the sensor substrate, with affixed conductive polymer strands, with a second medium containing mobile molecular recognition headgroups; and (d) applying a second potential to the substrate sufficient to affix the molecular recognition headgroups to the affixed conductive polymer strands.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 11 OF 11 USPATFULL on STN  
AN 1999:128361 USPATFULL  
TI Polymer-electrodes for detecting **nucleic acid** hybridization and method of use thereof  
IN Thorp, H. Holden, Chapel Hill, NC, United States  
Loomis, Carson R., Durham, NC, United States  
Napier, Mary E., Carrboro, NC, United States  
PA The University of North Carolina at Chapel Hill, Chapel Hill, NC, United States (U.S. corporation)  
Xanthos, Inc., Research Triangle Park, NC, United States (U.S. corporation)  
PI US 5968745 19991019  
AI US 1997-950503 19971014 (8)  
RLI Continuation-in-part of Ser. No. US 1996-667338, filed on 20 Jun 1996, now patented, Pat. No. US 5871918, issued on 16 Feb 1999 which is a continuation-in-part of Ser. No. US 1995-495817, filed on 27 Jun 1995, now abandoned  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Campbell, Eggerton A.

09567863

LREP Myers Bigel Sibley & Sajovec  
CLMN Number of Claims: 33  
ECL Exemplary Claim: 1  
DRWN 8 Drawing Figure(s); 5 Drawing Page(s)  
LN.CNT 1490

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A polymer-electrode including (a) a substrate having a conductive working surface; and (b) a polymer layer on the conductive working surface. The polymer layer has a plurality of microfluidic reaction openings distributed throughout the layer. An oligonucleotide probe can be attached to the polymer layer and is available to capture target **nucleic acid**. A soluble mediator can diffuse freely and transfer electrons from the preselected base in the hybridized **nucleic acid** to the conductive working surface of the substrate. An electronic signal generated from the electron transfer reaction is detected and quantitated.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=>

09/856,543

\*\*\*\*\* STN Columbus \*\*\*\*\*

FILE 'HOME' ENTERED AT 15:12:57 ON 20 FEB 2004

=> file biosis medline caplus wpids uspatfull

COST IN U.S. DOLLARS

SINCE FILE

TOTAL

ENTRY

SESSION

FULL ESTIMATED COST

0.21

0.21

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FILE 'CAPLUS' ENTERED AT 15:13:19 ON 20 FEB 2004

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FILE 'WPIDS' ENTERED AT 15:13:19 ON 20 FEB 2004

COPYRIGHT (C) 2004 THOMSON DERWENT

FILE 'USPATFULL' ENTERED AT 15:13:19 ON 20 FEB 2004

CA INDEXING COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)

\*\*\* YOU HAVE NEW MAIL \*\*\*

=> s conductive surface?

L1 18774 CONDUCTIVE SURFACE?

=> s l1 and nucleic acid? (7a) redox

3 FILES SEARCHED...

L2 16 L1 AND NUCLEIC ACID? (7A) REDOX

=> s l2 and potential

L3 11 L2 AND POTENTIAL

=> s l3 and hydrogen electrode

L4 1 L3 AND HYDROGEN ELECTRODE

=> d l4 bib abs

L4 ANSWER 1 OF 1 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2000-411931 [35] WPIDS

DNC C2000-124823

TI Modified nucleic acid oligomer, useful for sequencing by hybridization, is substituted by redox agent to allow electrical detection of hybridization.

DC B04 C07 D16 L02 L03

IN HARTWICH, G; HELLER, A

PA (HART-I) HARTWICH G; (FRIZ-N) FRIZ BIOCHEM GMBH

CYC 88

PI WO 2000031101 A1 20000602 (200035)\* DE 49p

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
OA PT SD SE SL SZ TZ UG ZW

W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DK EE ES FI GB GD  
GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV  
MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT  
UA UG US UZ VN YU ZA ZW

DE 19921940 A1 20000615 (200035)

AU 2000013836 A 20000613 (200043)

DE 19964220 A1 20010419 (200123)

EP 1133514 A1 20010919 (200155) DE

09567863

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

BR 9915526 A 20011113 (200201)  
KR 2001080973 A 20010825 (200215)  
CN 1324365 A 20011128 (200219)  
MX 2001003985 A1 20010601 (200235)  
AU 751220 B 20020808 (200263)  
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DE 19964220 C2 20030703 (200345)  
ZA 2001003180 A 20030625 (200348) 64p  
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ADT WO 2000031101 A1 WO 1999-EP8888 19991119; DE 19921940 A1 DE 1999-19921940  
19990429; AU 2000013836 A AU 2000-13836 19991119; DE 19964220 A1 Div ex DE  
1999-19921940 19990429, DE 1999-19964220 19990429; EP 1133514 A1 EP  
1999-972637 19991119, WO 1999-EP8888 19991119; BR 9915526 A BR 1999-15526  
19991119, WO 1999-EP8888 19991119; KR 2001080973 A KR 2001-705877  
20010510; CN 1324365 A CN 1999-812448 19991119; MX 2001003985 A1 MX  
2001-3985 20010420; AU 751220 B AU 2000-13836 19991119; JP 2002532386 W WO  
1999-EP8888 19991119, JP 2000-583928 19991119; DE 19921940 C2 DE  
1999-19921940 19990429; DE 19964220 C2 Div ex DE 1999-19921940 19990429,  
DE 1999-19964220 19990429; ZA 2001003180 A ZA 2001-3180 20010419; RU  
2213095 C2 WO 1999-EP8888 19991119, RU 2001-114192 19991119

FDT AU 2000013836 A Based on WO 2000031101; DE 19964220 A1 Div ex DE 19921940;  
EP 1133514 A1 Based on WO 2000031101; BR 9915526 A Based on WO 2000031101;  
AU 751220 B Previous Publ. AU 2000013836, Based on WO 2000031101; JP  
2002532386 W Based on WO 2000031101; DE 19921940 C2 Div in DE 19964220; DE  
19964220 C2 Div ex DE 19921940; RU 2213095 C2 Based on WO 2000031101

PRAI DE 1999-19921940 19990429; DE 1998-19853957 19981123

AN 2000-411931 [35] WPIDS

AB WO 200031101 A UPAB: 20000725

NOVELTY - **Nucleic acid oligomer (I)** modified by a  
**redox-active substance (II)** that is oxidizable and reducible  
selectively at a **potential** ( $\phi$ ) of 2 to -2 V, relative to the  
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following:

- (a) a method for producing (I);
- (b) a modified **conductive surface** that has one or  
more types of (I) bound to it;
- (c) a method for producing surfaces of (b); and
- (d) a method for electrochemical detection of nucleic acid oligomer  
hybridization events, using the surface of (b).

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ADVANTAGE - (I) permits electrical detection of a hybridization  
signal (eliminating the need for fluorophores, radioisotopes etc.),  
resulting in a simple and inexpensive method for sequence determination.  
It also opens up the possibility of developing a battery-operated  
sequencer for use in the field.

Dwg.0/5

=> s l2 not l3

L5 5 L2 NOT L3

=> d l5 bib abs 1-5

L5 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN

AN 2001:657546 CAPLUS

DN 135:222330

09567863

TI Thermostable, photoinducible **redox**-active unit for  
electrochemical detection of **nucleic acid**  
hybridization

IN Hartwich, Gerhard; Bandilla, Michael

PA Friz Biochem G.m.b.H., Germany

SO Ger. Offen., 16 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10049527	A1	20010906	DE 2000-10049527	20001006
	WO 2002029092	A2	20020411	WO 2001-DE3812	20011002
	WO 2002029092	A3	20021205		

W: US

RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,  
PT, SE, TR

PRAI DE 2000-10049527 A 20001006

AB An oligonucleotide which is conjugated to a thermostable, photoinducible redox-active unit is disclosed. This modified oligonucleotide can be used in a procedure for electrochem. detection of sequence-specific oligonucleotide hybridization. The modified oligonucleotide is attached by one end to a **conductive surface** and carries on the other one end the thermostable, photoinducible redox-active unit. Hybridization of the target oligonucleotide to the modified, immobilized oligonucleotide alters the elec. communication between the **conductive surface** and the thermostable, photoinducible redox-active unit. Detection of hybridization is made possible by electrochem. procedures such as voltammetry, amperometry or conductivity measurement. Thus, the photosynthetic reaction centers of Chloroflexus aurantiacus and Chromatium tepidum were isolated and their quinone cofactors removed. A gold electrode-immobilized oligonucleotide conjugated to a quinone derivative was complexed with the photosynthetic reaction center to prepare the thermostable, photoinducible redox-active unit. The C. aurantiacus system was stable up to 60° while the C. tepidum system was stable to 50°.

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN

AN 2001:228904 CAPLUS

DN 134:247934

TI Electrochemical detection of **nucleic acid**  
hybridization using probe conjugates with **redox** catalysts bound  
to electrode surfaces

IN Hartwich, Gerhard

PA Friz Biochem G.m.b.H., Germany

SO PCT Int. Appl., 71 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001021635	A2	20010329	WO 2000-DE3016	20000901
	WO 2001021635	A3	20010517		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,  
CR, CU, CZ, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU,  
ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,  
LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD,  
SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU,



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ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,  
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ,  
CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

DE 19945398 A1 20010405 DE 1999-19945398 19990922

EP 1228081 A1 20020807 EP 2000-972570 20000901

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
IE, SI, LT, LV, FI, RO, MK, CY, AL

PRAI DE 1999-19945398 A 19990922

WO 2000-DE3016 W 20000901

AB The present invention relates to a method for electrochem. detecting sequence-specific nucleic acid-oligomer hybridization events. Nucleic acid or PNA probes which are bound to a **conductive surface** at one end and are linked to a redox catalyst moiety at the remaining, free end serve as a hybridization matrix. A proportion of the single strand oligonucleotides are hybridized by means of a treatment with the oligonucleotide solution (target) that is to be examined. The elec. communication between the **conductive surface** and the redox catalyst, which is initially non- or barely existent, is increased by hybridization. A hybridization event can thus be detected using electrochem. methods such as voltammetry, amperometry, potentiometry or conductivity measurement.

L5 ANSWER 3 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:427507 CAPLUS

DN 131:69262

TI Method for electrochemical detection of sequence-specific nucleic acid-oligomer hybridization

IN Hartwich, Gerhard

PA Germany

SO Ger. Offen., 28 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DE 19901761	A1	19990701	DE 1999-19901761	19990118
DE 19926457	A1	20000727	DE 1999-19926457	19990429
WO 2000042217	A2	20000720	WO 2000-EP84	20000107
WO 2000042217	A3	20001130		

W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ,  
DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,  
KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN,  
MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,  
TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD,  
RU, TJ, TM

RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE,  
DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF,  
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

EP 1144685 A2 20011017 EP 2000-904884 20000107

EP 1144685 B1 20030423

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
IE, SI, LT, LV, FI, RO

BR 2000007571 A 20011127 BR 2000-7571 20000107

AU 758063 B2 20030313 AU 2000-26627 20000107

AT 238436 E 20030515 AT 2000-904884 20000107

JP 2003521465 T2 20030715 JP 2000-593774 20000107

ZA 2001005097 A 20020219 ZA 2001-5097 20010621

NO 2001003471 A 20010913 NO 2001-3471 20010713

PRAI DE 1999-19901761 A1 19990118

DE 1999-19926457 A 19990429

WO 2000-EP84 W 20000107

AB The title method is disclosed. The method comprises use of a DNA/RNA/PNA oligomer, one end of which is attached to a **conductive surface**, the other end of which is attached to a photoinducible redox-active substance. Upon hybridization of this tethered oligomer derivative, the elec. communication between the redox-active substance and **conductive surface** is increased. This hybridization-enhanced elec. current can be detected by amperometry, voltammetry or conductivity measurements. Two types of oligonucleotide derivs. were described. The oligonucleotides were attached to a gold-coated mica surface. The other end of one of the oligonucleotides was attached to ubiquinone and this was complexed with the reaction center protein of Rhodobacter sphaeroides. The other oligonucleotide was conjugated to the quinone cofactor PQQ which was in turn conjugated to Zn-bacteriochlorophyll.

L5 ANSWER 4 OF 5 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2000-482839 [42] WPIDS

CR 1999-372624 [32]

DNC C2000-145333

TI Modified nucleic acid oligomer used for electrical detection of hybridization, has covalently bonded to it redox-active units containing electron-donor and -acceptor molecules.

DC B04 D16

IN HARTWICH, G

PA (HART-I) HARTWICH G; (FRIZ-N) FRIZ BIOCHEM GMBH; (FRIZ-N) RIZ BIOCHEM CO LTD

CYC 88

PI WO 2000042217 A2 20000720 (200042)\* DE 76p

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
OA PT SD SE SL SZ TZ UG ZW

W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DK EE ES FI GB GD  
GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV  
MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT  
UA UG US UZ VN YU ZA ZW

DE 19926457 A1 20000727 (200042)

AU 2000026627 A 20000801 (200054)

NO 2001003471 A 20010913 (200163)

EP 1144685 A2 20011017 (200169) DE

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

BR 2000007571 A 20011127 (200203)

CZ 2001002503 A3 20020116 (200215)

KR 2001101477 A 20011114 (200230)

ZA 2001005097 A 20020424 (200237) # 99p

HU 2001005170 A2 20020528 (200249)

CN 1352697 A 20020605 (200261)

AU 758063 B 20030313 (200328)

EP 1144685 B1 20030423 (200329) DE

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

DE 50001859 G 20030528 (200336)

JP 2003521465 W 20030715 (200347) 93p

MX 2001007183 A1 20020601 (200365)

ADT WO 2000042217 A2 WO 2000-EP84 20000107; DE 19926457 A1 DE 1999-19926457  
19990429; AU 2000026627 A AU 2000-26627 20000107; NO 2001003471 A WO  
2000-EP84 20000107, NO 2001-3471 20010713; EP 1144685 A2 EP 2000-904884  
20000107, WO 2000-EP84 20000107; BR 2000007571 A BR 2000-7571 20000107, WO  
2000-EP84 20000107; CZ 2001002503 A3 WO 2000-EP84 20000107, CZ 2001-2503  
20000107; KR 2001101477 A KR 2001-708801 20010712; ZA 2001005097 A ZA  
2001-5097 20010621; HU 2001005170 A2 WO 2000-EP84 20000107, HU 2001-5170  
20000107; CN 1352697 A CN 2000-803149 20000107; AU 758063 B AU 2000-26627

09567863

20000107; EP 1144685 B1 EP 2000-904884 20000107, WO 2000-EP84 20000107; DE 50001859 G DE 2000-501859 20000107, EP 2000-904884 20000107, WO 2000-EP84 20000107; JP 2003521465 W JP 2000-593774 20000107, WO 2000-EP84 20000107; MX 2001007183 A1 WO 2000-EP84 20000107, MX 2001-7183 20010713  
FDT AU 2000026627 A Based on WO 2000042217; EP 1144685 A2 Based on WO 2000042217; BR 2000007571 A Based on WO 2000042217; CZ 2001002503 A3 Based on WO 2000042217; HU 2001005170 A2 Based on WO 2000042217; AU 758063 B Previous Publ. AU 2000026627, Based on WO 2000042217; EP 1144685 B1 Based on WO 2000042217; DE 50001859 G Based on EP 1144685, Based on WO 2000042217; JP 2003521465 W Based on WO 2000042217; MX 2001007183 A1 Based on WO 2000042217

PRAI DE 1999-19926457 19990429; DE 1999-19901761 19990118; ZA 2001-5097 20010621

AN 2000-482839 [42] WPIDS

CR 1999-372624 [32]

AB WO 200042217 A UPAB: 20031009

NOVELTY - Nucleic acid oligomer (A) is modified by covalent bonding to it of a redox-active unit (I) comprising one or more each of electron-donor (ED) molecules (II) and electron-acceptor (EA) molecules (III).

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

- (1) a method for producing (A);
- (2) a **conductive surface** (B) modified by attachment of one or more types of (A);
- (3) a method for producing (B); and
- (4) a method for electrochemical detection of oligomer hybridization by incubating (B) with nucleic acid oligomer and detecting subsequent electrical communication between (I) and the conducting surface.

USE - Electrically **conductive surfaces** modified with (A) are used for sequence-specific detection of nucleic acid hybridization, e.g. for clinical diagnosis, toxicological testing or generally in research and development, e.g. for nucleic acid sequencing.

ADVANTAGE - Electrical detection of hybridization is simple and inexpensive and makes possible development of a battery-operated system for on site analysis. It eliminates the need for gel electrophoresis and the associated use of radioisotopes or mutagenic dyes.

DESCRIPTION OF DRAWING(S) - Diagram of gold surface derivatized with an oligonucleotide that has been modified by attachment of ubiquinone (electron acceptor; UQ) at the 5'-end. When induced, electrons will pass from the reaction center (RC, e.g. from the photosynthetic bacterium *Rhodobacter sphaeroides*) to UQ and from there to the gold surface, but only if the oligonucleotide is hybridized to its complement. When in unhybridized form, the oligonucleotide has electrical conductivity too low to transport electrons to the gold surface.

Dwg.4/6

L5 ANSWER 5 OF 5 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1999-372624 [32] WPIDS

CR 2000-482839 [41]

DNN N1999-278010 DNC C1999-110177

TI Oligonucleotides tagged with photoinducible redox-active unit - for binding to **conductive surfaces** for electrochemical detection of hybridisation.

DC B04 D16 S03

IN HARTWICH, G

PA (HART-I) HARTWICH G

CYC 1

PI DE 19901761 A1 19990701 (199932)\* 28p

ADT DE 19901761 A1 DE 1999-19901761 19990118

PRAI DE 1999-19901761 19990118

AN 1999-372624 [32] WPIDS

CR 2000-482839 [41]

09567863

AB DE 19901761 A UPAB: 20000905

A **nucleic acid** oligomer with a photoinducible **redox**-active unit comprising one or more electron donors and one or more electron acceptors covalently attached is new.

Also claimed is (1) a modified **conductive surface** comprising one or more modified nucleic acid oligomers as above bound to a **conductive surface**; and (2) a method for electrochemically detecting oligomer hybridisation, comprising contacting a modified **conductive surface** as above with nucleic acid oligomers.

USE - Probes comprising single-stranded DNA, RNA or PNA (peptide nucleic acid) oligomers linked at one end to a **conductive surface** and at the other end to a photoinducible redox-active unit can be used to detect hybridisation of a target oligonucleotides. This is possible because hybridisation increases the electrical communication between the **conductive surface** and the photoinducible redox-active unit. The probes may also be used for sequencing and detection of mismatched basepairs.  
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